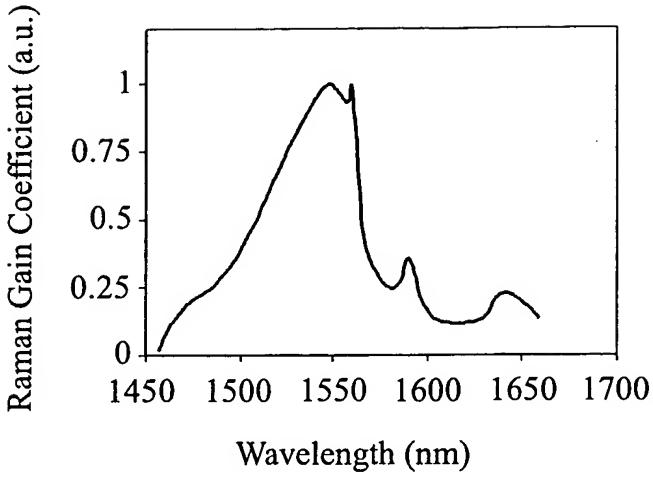


Fig. 1 - Normalized Raman Gain Spectrum of standard single mode fiber. Pump wavelength is at 1450 nm.

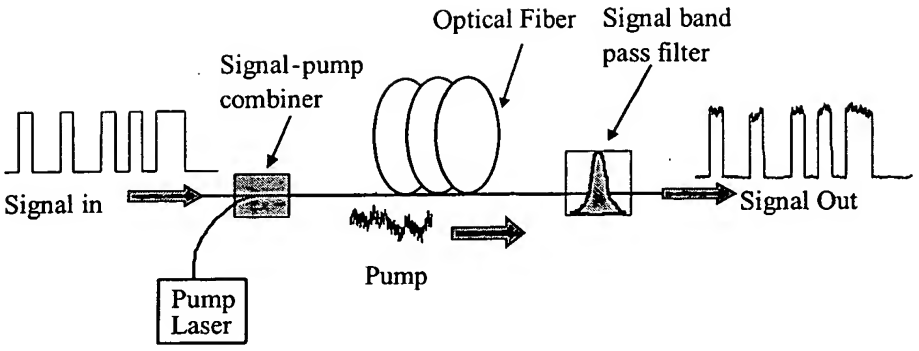


Fig. 2 - Distributed Raman amplification using forward pump (co propagating pump and signal). The noise of pump and signal beams are schematically drawn.

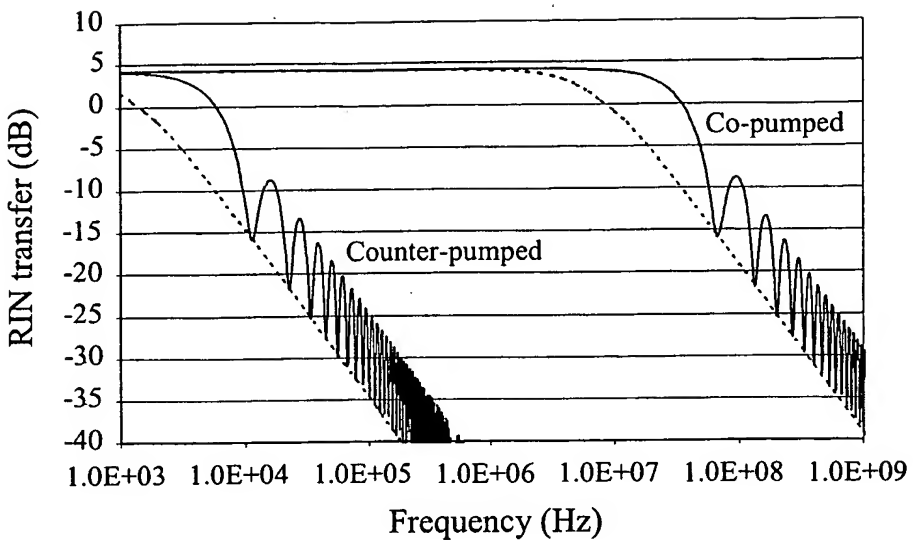


Fig. 3 - RIN transfer spectrum for a co- and counter-pumped Raman amplifier with 10 dB of gain. Pump attentuation = 0.29 dB/km, length = 10km (solid line) and 80km (dotted line), dispersion = 15.6 ps.nm km^{-1}, pump at 1455 nm and signal at 1555 nm [5].

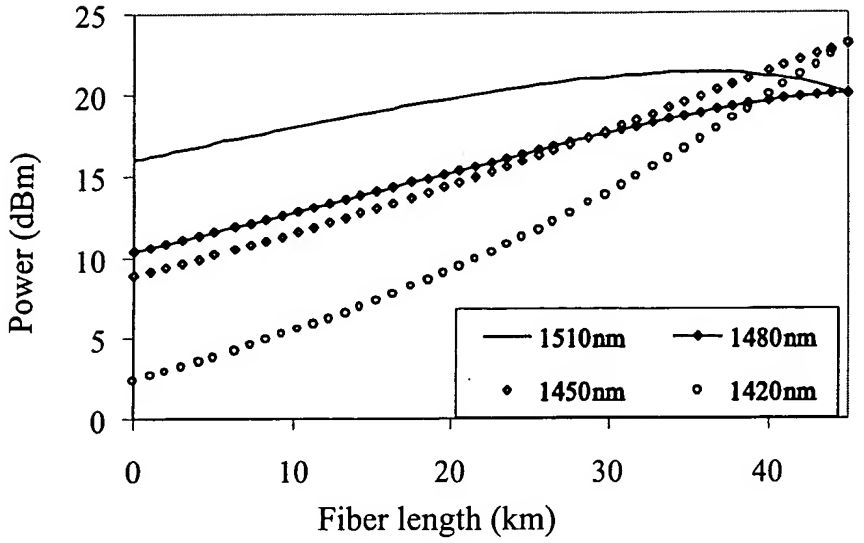
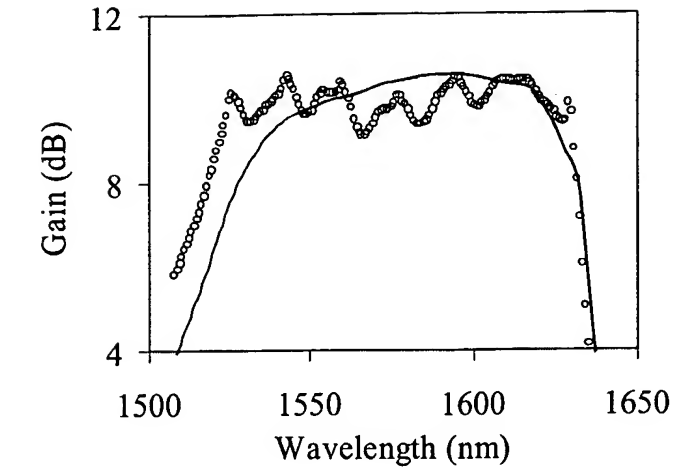
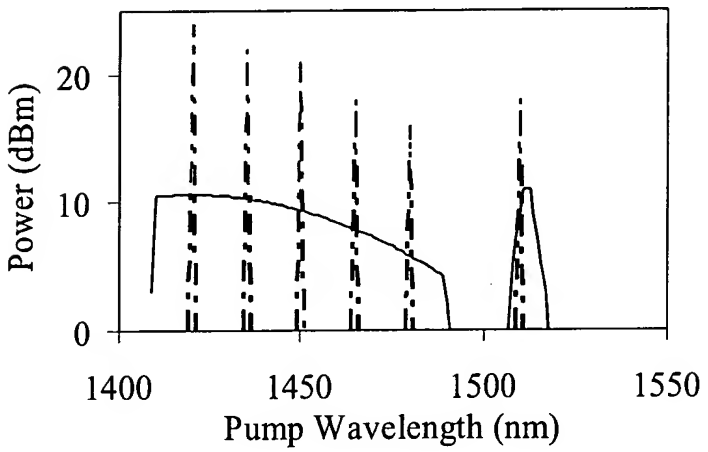


Fig. 4 - Power evolution of pump diode lasers along the fiber path. The pump wavelengths are: 1420 nm, 1450 nm, 1480 nm and 1510 nm. The longer wavelength pump (1510 nm) is amplified by short wavelength pumps.



(a)



(b)

Fig. 5 - Simulated Raman gain shape (a) achieved using 6 discrete pump wavelengths (open dots) and that with 2 broadband sources (solid curve). The pump wavelength and power distribution are shown in the lower plot (b).

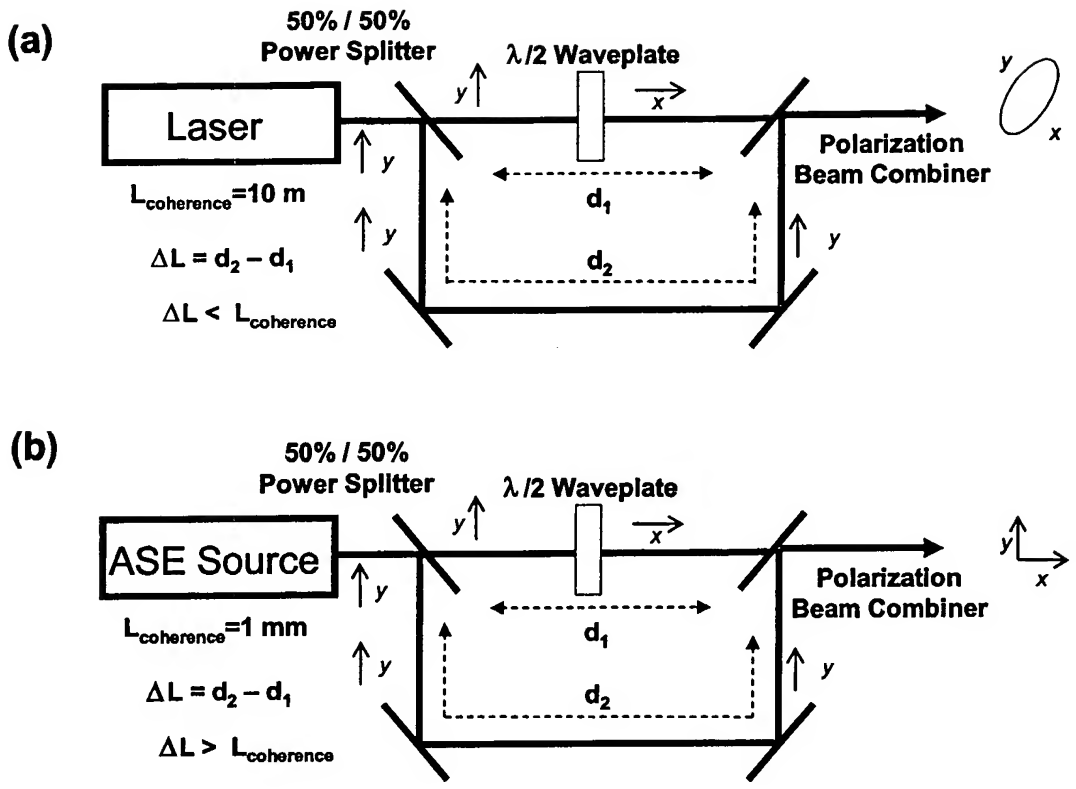


Fig. 6 - Schematic of the optical elements of a depolarizer and a pictorial illustration of polarization state for (a) long and (b) short coherence sources.

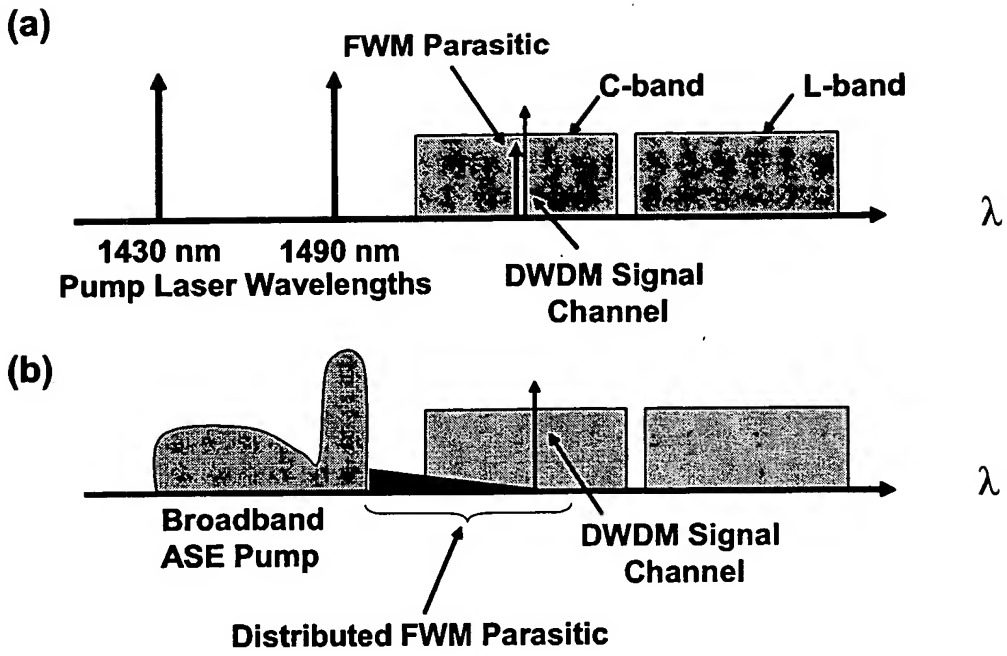


Fig. 7 - Illustration of the reduction of FWM achieved in a Raman amplifier pump with (a) discrete wavelengths and with (b) broadband ASE source as compared to a Raman amplifier pumped. The broadband ASE pump in figure (b) is sketched only graphically.

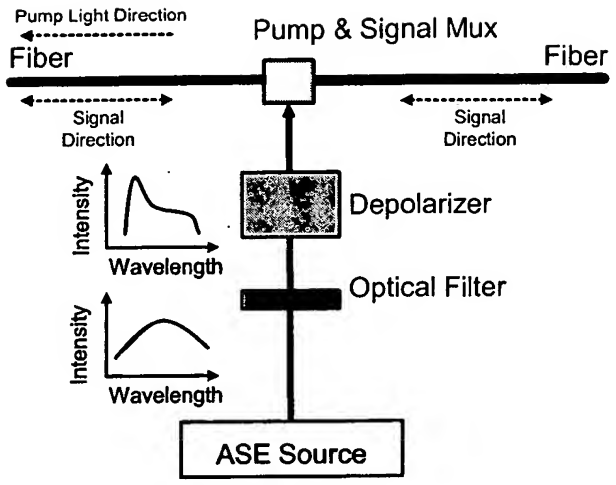


Fig. 8 - Block schematic of Broadband ASE Raman Pump Source (Forward or Backward Pumping).

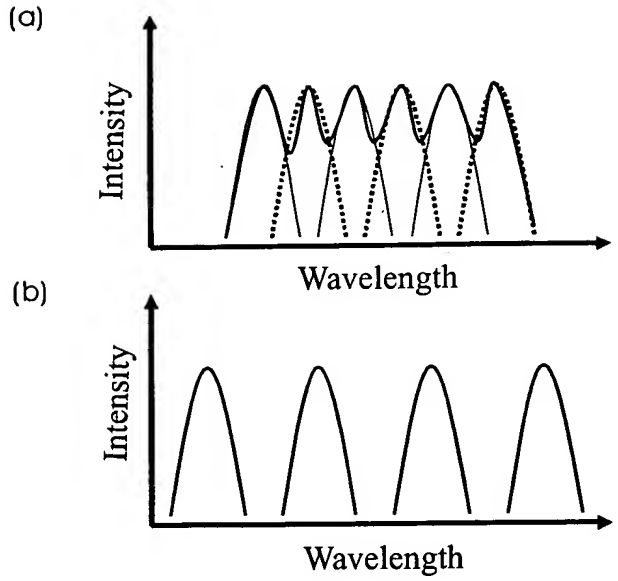


Fig. 9 - Illustration of how multiple filtered or unfiltered narrow bandwidth (e.g. 3-40 nm) ASE sources can be superimposed to form a (a) continuous or (b) discontinuous high power ASE spectrum for Raman pumping.

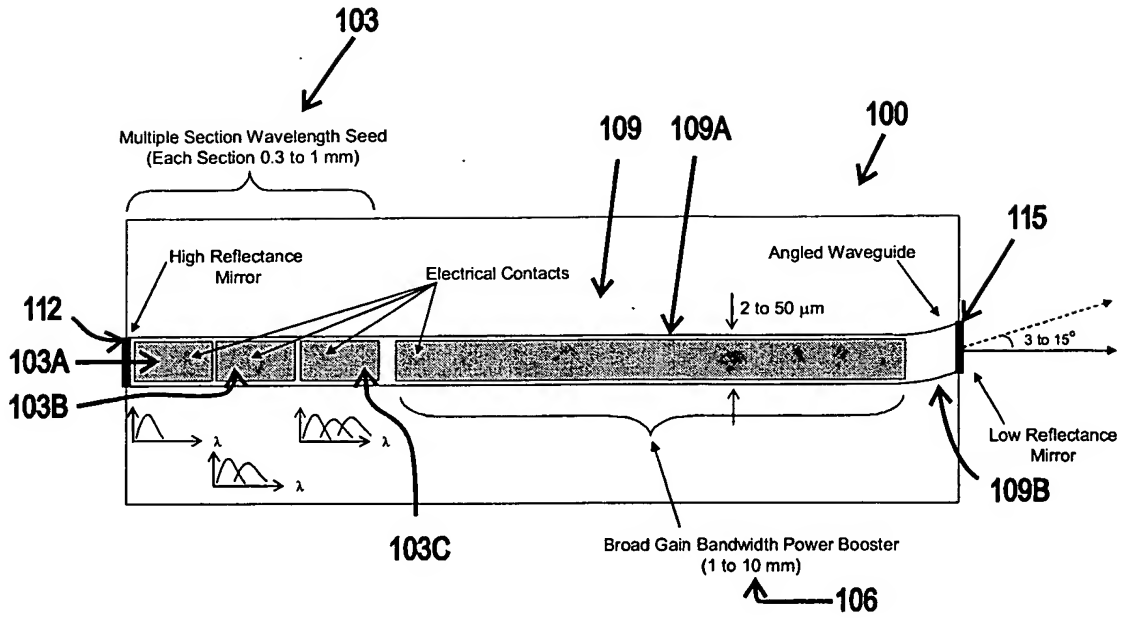


Fig. 10 - Shows a schematic of the semiconductor chip for preferred embodiment #1. The chip consists of a serial connection of a wavelength seed section and a power booster or power amplification section.

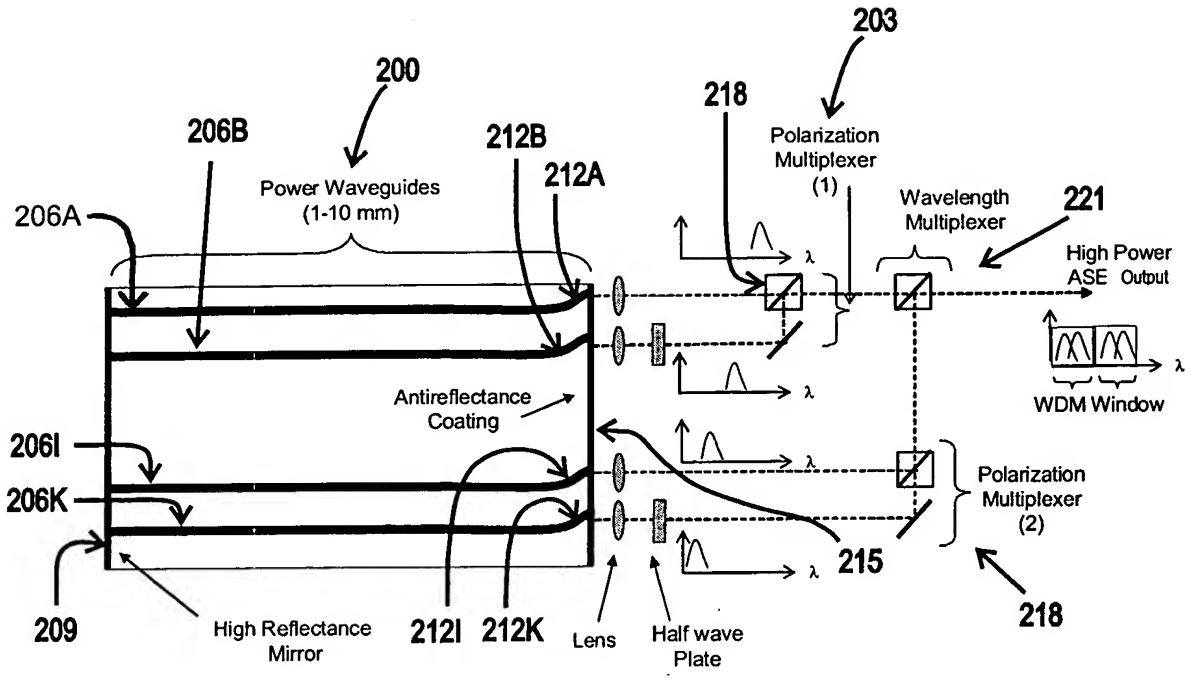


Fig. 11 - A schematic of the semiconductor die and optical train for preferred embodiment #2.

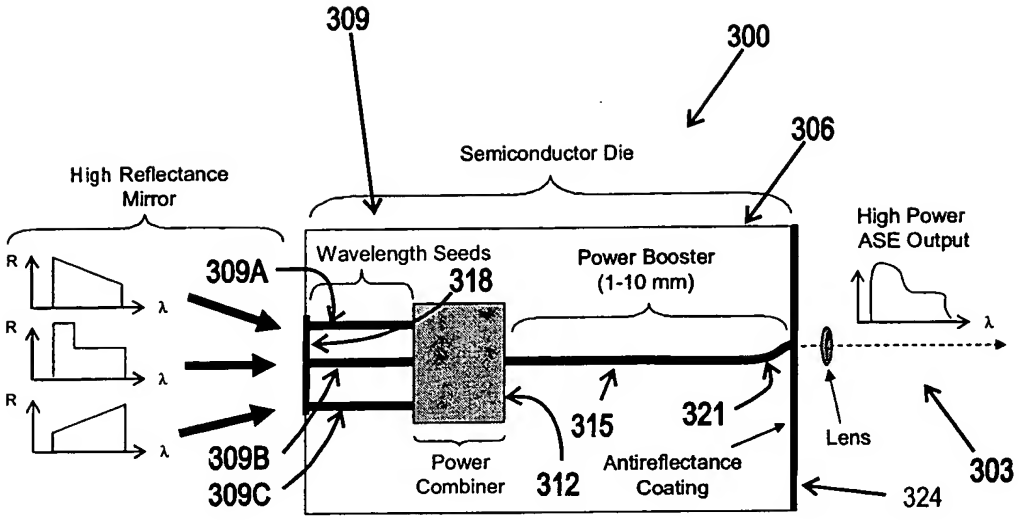


Fig. 12 - Schematic of the semiconductor die and optical train for preferred embodiment #3.

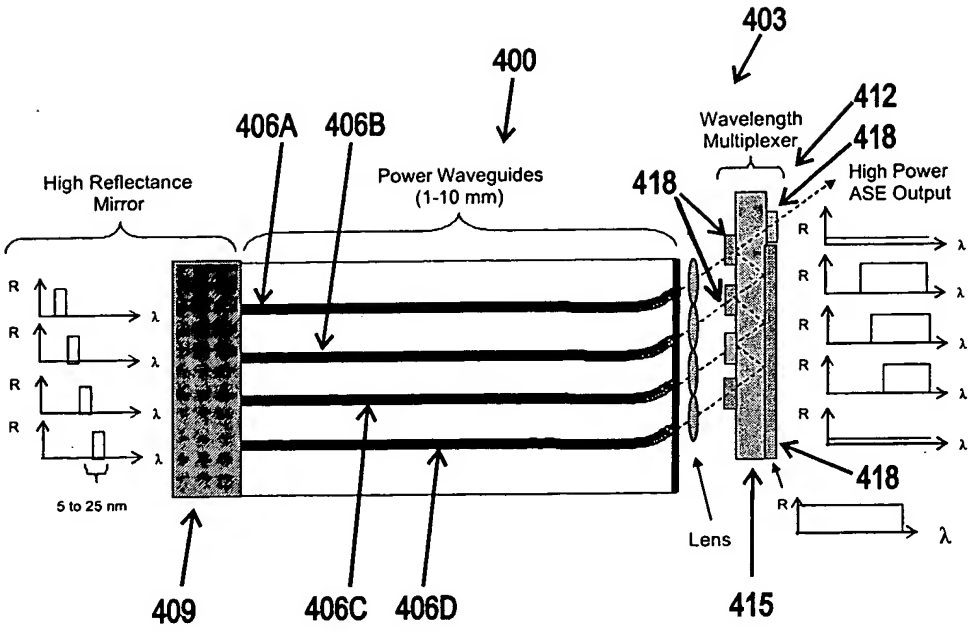


Fig. 13 - Schematic of the semiconductor die and optical train for preferred embodiment #4.

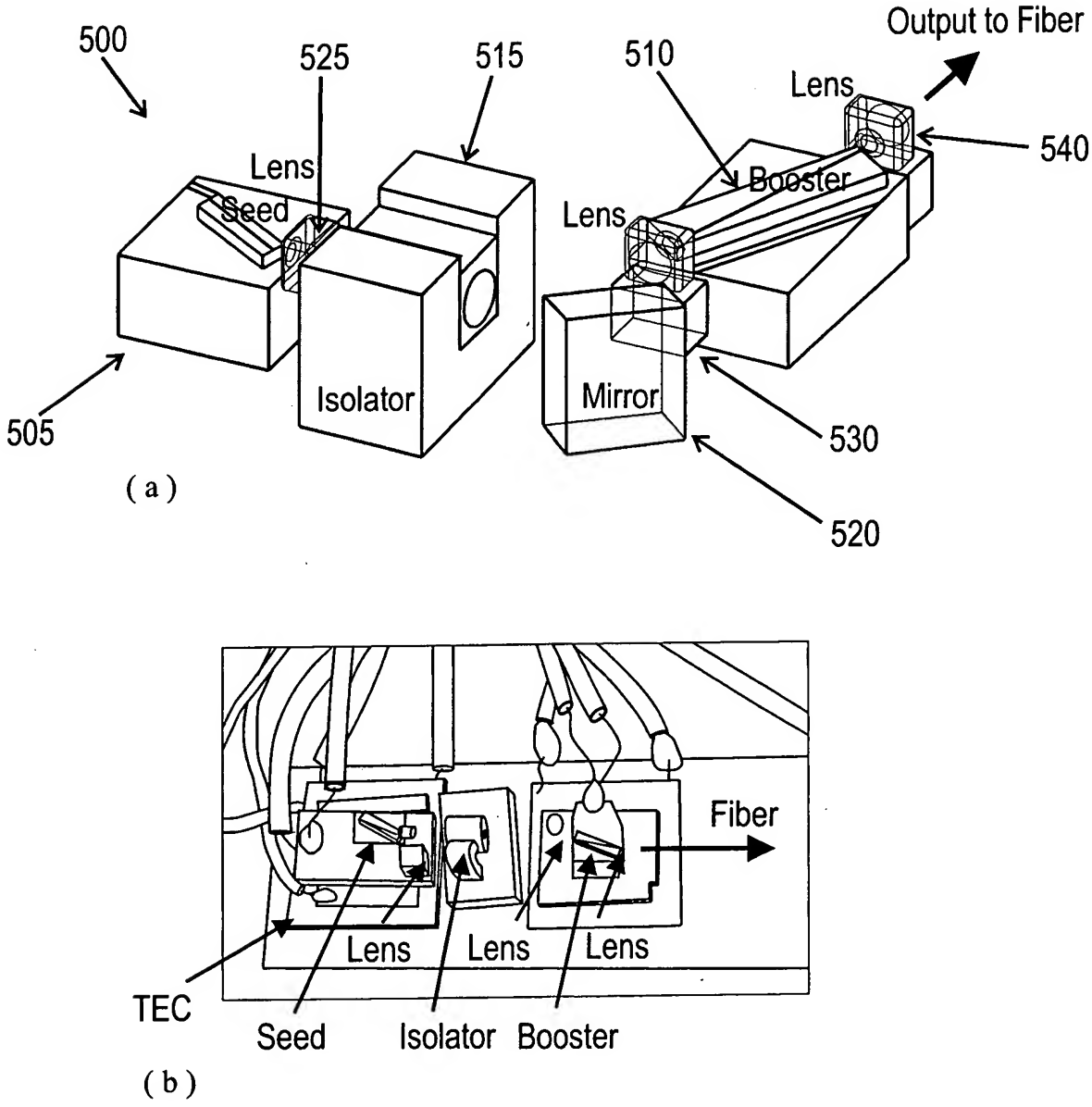


Fig. 14 - The Use of a Discrete Seed and Booster to Generate High Power ASE. (a) shows the schematic of the experimental setup and (b) presents a photograph of the actual microoptical bench setup.